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10/682,561	10/09/2003	Jeffery H. Banning	D/A0415	2778

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EXAMINER	
SHOSHO, CALLIE E	
ART UNIT	PAPER NUMBER
1714	

DATE MAILED: 10/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No. 10/682,561	Applicant(s) BANNING ET AL.	
	Examiner Callie E. Shosho	Art Unit 1714	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-39 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) 1-39 is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 10/9/03.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. All the cited copending applications have been stricken from the IDS filed 10/9/03 since these applications are not available to the public.

It is noted that all the copending applications have issued as U.S. patents, i.e. U.S. 7,034,185, U.S. 6,790,267, U.S. 7,094,812, U.S. 6,764,541, and U.S. 7,084,189 which have been considered and cited on the PTO-892 attached to this office action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 6-7, 9, 16, and 24-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

(a) Claim 6 recites that the anhydride copolymer has a "molecular weight" of at least about 750. The scope of the claim is confusing because it is not clear what type of molecular weight is being claimed – weight average, number average, etc.

Similar confusion arises in the scope of claim 7 which also recites "molecular weight".

(b) Claim 9 recites an improper Markush group. It is suggested that either (i) in line 2 after "from", the phrase (for instance) "chromogen selected from the group consisting of" is inserted or (ii) in line 6, before "mixture" "and" is changed to "or".

(c) Claim 16 recites an improper Markush group. In line 20, it is advised that before "mixture" "or" is changed to "and".

(d) Claim 24 recites that the antioxidant or UV stabilizer molecular has (A) at least one "isocyanate-reactive" hydroxyl group and/or (B) at least one "isocyanate-reactive" primary or secondary amine group. Given that the antioxidant or UV stabilizer is covalently bonded to the anhydride copolymer which does not appear to comprise isocyanate group, it is not clear why the antioxidant or UV stabilizer requires an "isocyanate-reactive" moiety. Clarification is requested.

Similar confusion arises in claim 26 that also recites the phrase "isocyanate-reactive" with respect to the antioxidant or UV stabilizer.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this

> subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-5, 14, 17, and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Horiguchi et al. (U.S. 3,563,931).

Horiguchi et al. disclose ink comprising vehicle and chromogen-bonded polymer which is dissolved or dispersed in the vehicle and is a copolymer obtained from maleic anhydride. The vehicle includes aqueous vehicle. Attention is drawn to example 37 that discloses producing chromogen-bonded polymer wherein the polymer is obtained from butyl acrylate, styrene, and maleic anhydride which is then reacted with primary amine which would inherently result in the anhydride having amide group covalently bonded thereto (col.1, lines 13-33, col.2, lines 14-21, col.12, lines 20-36, col.14, line 51, col.16, line 57-col.17, line 7, and col.39, line 67).

In light of the above, it is clear that Horiguchi et al. anticipate the present claims.

6. Claims 1-7, 12-14, 19-22, and 35-37 are rejected under 35 U.S.C. 102(e) as being anticipated by Palumbo (U.S. 6,916,367).

Palumbo disclose ink jet ink comprising aqueous liquid and colorant that comprises chromogen, i.e. pigment, having at least one thiopolymer covalently bonded thereto wherein the polymer is obtained by reacting styrene-maleic anhydride with substituted alkyl or aryl thiol. The styrene-maleic anhydride possesses molecular weight of 5,500-9,500. It is disclosed that the weight ratio of thiopolymer to pigment is 0.1/1 to 10/1 while the weight ratio of thiol group to pigment is 0.1/1 to 10/1 and thus, it is also calculated that the weight ratio of thiopolymer to thiol group is 0.01 (0.1/10) – 100 (10/0.1). Although Palumbo disclose ratio of thiopolymer to thiol group in terms of weight ratio and the present claims require mole ratio, given the broad range of ratio disclosed by Palumbo, it is clear that such weight ratio would overlap the presently claimed molar ratio. Although there is no explicit disclosure of utilizing the above ink in an ink jet apparatus and then ejecting the ink onto substrate as required in present claims 36-37, given that Palumbo discloses that the ink is an ink jet ink, it is clear that printing the ink would necessarily and inherently involve placing the ink in an ink jet apparatus and then ejecting the ink onto substrate as presently claimed (col.1, lines 13-14 and 58-67, col.2, lines 4-11 and 33-42, col.4, lines 5-8, col.4, line 62-col.5, line 4, col.5, lines 8-19, col.6, lines 22-31, col.7, lines 29-42, and Table 1).

In light of the above, it is clear that Palumbo anticipates the present claims.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

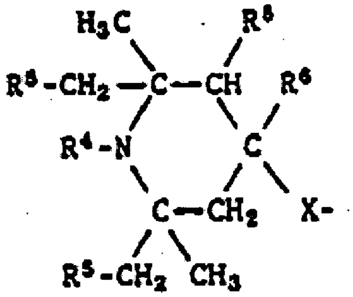
8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 23-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Palumbo (U.S. 6,916,367) in view of EP 303987.

The disclosure with respect to Palumbo in paragraph 6 above is incorporated here by reference.

The difference between Palumbo and the present claimed invention is the requirement in the claim of antioxidant or UV stabilizer covalently attached to the anhydride copolymer.

EP 30398 discloses anhydride copolymer with hindered amine covalently bonded thereto wherein the hindered amine is of the formula:



which corresponds to presently claimed formula (3) when R^4 is hydrogen, R^5 is hydrogen or alkyl group (corresponding to presently claimed substituent R_{43}), and R^6 is alkoxy or hydroxyl group (corresponding to presently claimed substituent R_{42}). From Table 1, it is seen that the mole ratio of anhydride to hindered amine is 0.1 (0.014/0.13) to 11 (0.2/0.018). The motivation for using anhydride copolymer with hindered amine covalently bonded thereto is to inhibit degradation and discoloration upon exposure to heat and/or light (page 3, lines 5-12, page 3, line 40-page 5, line 3, page 5, lines 13-16, page 6, line 51-page 7, line 21, and Table 1).

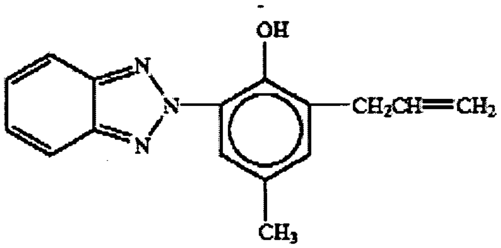
In light of the motivation for utilizing anhydride copolymer with hindered amine covalently bonded thereto disclosed by EP 303987 as described above, it therefore would have been obvious to one of ordinary skill in the art to use such anhydride copolymer in the ink of Palumbo in order to produce ink that does not degrade or discolor upon exposure to heat and/or light, and thereby arrive at the claimed invention.

10. Claims 23-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Palumbo (U.S. 6,916,367) in view of Miyabayashi (U.S. 6,590,012).

The disclosure with respect to Palumbo in paragraph 6 above is incorporated here by reference.

The difference between Palumbo and the present claimed invention is the requirement in the claim of antioxidant or UV stabilizer covalently attached to the anhydride copolymer.

Miyabayashi polymer with UV stabilizer including benzophenone, benzotriazole, or hindered phenol covalently bonded thereto wherein UV stabilizer includes, for instance,



which corresponds to the presently claimed formula (2) when R_{20}-R_{24} and R_{26}-R_{27} are each hydrogen and R_{25} is alkyl. The motivation for using polymer with UV stabilizer covalently bonded thereto is produce ink with satisfactory lightfastness (col.5, lines 15-24, col.10, lines 30-35, and col.12, line 55).

In light of the motivation for utilizing polymer with UV stabilizer covalently bonded thereto disclosed by Miyabayashi as described above, it therefore would have been obvious to one of ordinary skill in the art to use anhydride copolymer with such UV stabilizer covalently bonded thereto in the ink of Palumbo in order to produce ink with satisfactory lightfastness, and thereby arrive at the claimed invention.

11. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Palumbo (U.S. 6,916,367) in view of Ma et al. (U.S 5,648,405).

The disclosure with respect to Palumbo in paragraph 6 above is incorporated here by reference.

The difference between Palumbo and the present claimed invention is the requirement in the claim of the viscosity of the ink.

Ma et al., which is drawn to ink jet ink, disclose that in order to for ink to be suitable for ink jet printing, i.e. ink has proper jet velocity, separation length of droplets, drop size, and shear stability, the ink must possess viscosity of less than 10 cP (col.5, lines 39-46).

In light of the motivation for using ink with specific viscosity disclosed by Ma et al. as described above, it therefore would have been obvious to one of ordinary skill in the art to control the viscosity of the ink of Palumbo to less than 10 cP in order to produce ink that is effectively utilized in ink jet printer, and thereby arrive at the claimed invention.

12. Claims 33-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Palumbo (U.S. 6,916,367) in view of GB 2,344,825.

The disclosure with respect to Palumbo in paragraph 6 above is incorporated here by reference.

The difference between Palumbo and the present claimed invention is the requirement in the claims that the ink comprises base.

GB 2,344,825, which is drawn to ink jet ink, discloses the use of base such as triethanolamine, ammonia, hydroxides, etc. in order to control the pH of the ink (page 5, lines 23-30 and page 10, lines 5-9).

In light of the motivation for using base disclosed by GB 2,344,825 as described above, it therefore would have been obvious to one of ordinary skill in the art to use such base in the ink of Palumbo in order to produce ink with desired pH, and thereby arrive at the claimed invention.

13. Claims 1-7, 10, 12-18, 21-22, and 30-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB 2,344,825 in view of Parker (U.S. 4,963,188).

GB 2,344,825 discloses ink jet ink possessing viscosity less than 10 cP wherein the ink comprises 70-99.75% aqueous liquid medium, base such as triethanolamine, ammonia, hydroxides, etc., and 0.25-30% colored polymer that is soluble in the liquid medium and comprises polymer having anhydride group covalently bonded to colorant, i.e. chromophore. It is disclosed that the polymer has molecular weight less than 70,000 and includes copolymers obtained from anhydride such as maleic anhydride, itaconic anhydride, dimethylmaleic anhydride, etc. and other monomer such as acrylic acid, styrene, alkyl (meth)acrylate, vinyl ether, etc. It is disclosed that the mole ratio of colorant to anhydride group is 1/20 to 10/1. There is further disclosed printing method wherein the ink is incorporated into thermal or piezoelectric ink jet printer and then ejected onto substrate to form image (page 1, lines 20-26, page 2, lines 17-18 and 23-26, page 3, lines 25-33, page 4, lines 24-28, page 4, lines 39-page 5, line 7, page 5, lines 31-page 7, lines 5, page 8, lines 8-15 and 23-27, page 10, lines 5-11 and 20-30, page 11, lines 1-5 and 20-25, and page 12, lines 1-9).

The difference between GB 2,344,825 and the present claimed invention is the requirement in the claims that the anhydride copolymer has at least one ester, amide, imide, or thioester attached thereto.

Parker, which is drawn to water-based ink, disclose reacting anhydride copolymer with alcohol such as ethanol, propanol, dimethylaminoethanol or amine such as butyl amine or morpholine in order to improve the solubility and film properties of the copolymer . It is disclosed that the ratio of anhydride group to alcohol is 0.5 to 5 (col.1, lines 6-9 and col.5, lines 10-36).

In light of the motivation for utilizing anhydride having at least one ester or amide attached thereto disclosed by Parker as described above, it therefore would have been obvious to one of ordinary skill in the art to use such anhydride copolymer in GB 2,344,825 in order to produce copolymer with improved solubility and ink with improved film properties, and thereby arrive at the claimed invention.

14. Claims 8 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB 2,344,825 in view of Parker as applied to claims 1-7, 10, 12-18, 21-22, and 30-39 above, and further in view of either Banning et al. '541 (U.S. 6,764,541), Banning et al. '812 (U.S. 7,094,812), or Banning et al. '267 (U.S. 6,790,267).

The difference between GB 2,344,825 in view of Parker and the present claimed invention is the requirement in the claims of specific chromogen.

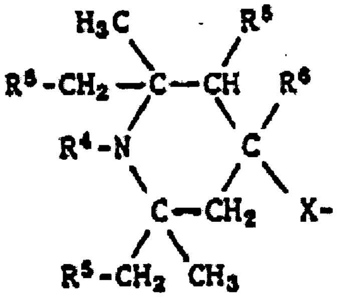
Banning et al.' 541, Banning et al. '812, and Banning et al. '267 disclose chromogen identical to presently claimed formula (c), formula (b), and formula (a), respectively. The chromogen is reacted with anhydride copolymer. The chromogen has reduced toxicity and resists migration or settling (Banning et al. '541 – col.2, line 39-col.3, line 47, col.10, line 54-col.11, line 2, col.12, line 27-col.14, line 17, col.21, lines 49-50 and 55, and col.23, lines 54-57; Banning et al. '812 – col.2, line 34-col.4, line 8, col.11, line 66-col.12, line 16, col.14, line 8-col.16, line 2, col.26, line 44-col.27, line 10, and col.27, lines 18-19; Banning et al. '2687 – col.2, line 29-col.3, line 65, col.11, lines 4-19, col.13, line 4-col.14, line 56, col.24, lines 17-18 and 20 and col.26, lines 21-24).

In light of the motivation for using specific chromogen disclosed by Banning et al.' 541, Banning et al. '812, or Banning et al. '267 as described above, it therefore would have been obvious to one of ordinary skill in the art to use such chromogen in GB 2,344,825 in order to produce ink with reduced toxicity wherein the chromogen does not migrate or settle, and thereby arrive at the claimed invention.

15. Claims 23-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB 2,344,825 in view of Parker as applied to claims 1-7, 10, 12-18, 21-22, and 30-39 above, and further in view of EP 303987.

The difference between GB 2,344,825 in view of Parker and the present claimed invention is the requirement in the claims of antioxidant or UV stabilizer covalently attached to the anhydride copolymer.

EP 30398 discloses anhydride copolymer with hindered amine covalently bonded thereto wherein the hindered amine is of the formula:



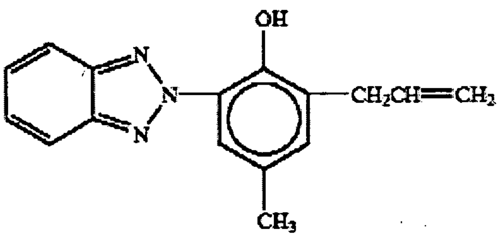
which corresponds to presently claimed formula (3) when R^4 is hydrogen, R^5 is hydrogen or alkyl group (corresponding to presently claimed substituent R_{43}), and R^6 is alkoxy or hydroxyl group (corresponding to presently claimed substituent R_{42}). From Table 1, it is seen that the mole ratio of anhydride to hindered amine is 0.1 (0.014/0.13) to 11 (0.2/0.018). The motivation for using anhydride copolymer with hindered amine covalently bonded thereto is to inhibit degradation and discoloration upon exposure to heat and/or light (page 3, lines 5-12, page 3, line 40-page 5, line 3, page 5, lines 13-16, page 6, line 51-page 7, line 21, and Table 1).

In light of the motivation for utilizing anhydride copolymer with hindered amine covalently bonded thereto disclosed by EP 303987 as described above, it therefore would have been obvious to one of ordinary skill in the art to use such anhydride copolymer in the ink of GB 2,344,825 in order to produce ink that does not degrade or discolor upon exposure to heat and/or light, and thereby arrive at the claimed invention.

16. Claims 23-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB 2,344,825 in view of Parker as applied to claims 1-7, 10, 12-18, 21-22, and 30-39 above, and further in view of Miyabayashi (U.S. 6,590,012).

The difference between GB 2,344,825 in view of Parker and the present claimed invention is the requirement in the claims of antioxidant or UV stabilizer covalently attached to the anhydride copolymer.

Miyabayashi polymer with UV stabilizer including benzophenone, benzotriazole, or hindered phenol covalently bonded thereto wherein UV stabilizer includes, for instance,



which corresponds to the presently claimed formula (2) when R_{20}-R_{24} and R_{26}-R_{27} are each hydrogen and R_{25} is alkyl. The motivation for using polymer with UV stabilizer covalently bonded thereto is produce water-soluble ink with satisfactory lightfastness (col.5, lines 15-24, col.10, lines 30-35, and col.12, line 55).

In light of the motivation for utilizing polymer with UV stabilizer covalently bonded thereto disclosed by Miyabayashi as described above, it therefore would have been obvious to one of ordinary skill in the art to use anhydride copolymer with such UV stabilizer covalently bonded thereto in the ink of GB 2,344,825 in order to produce ink with satisfactory lightfastness, and thereby arrive at the claimed invention.

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Cherioux et al. (*New Third-Order Nonlinear Polymers Functionalized with Disperse Red and Disperse Orange Chromophores with Increased Stability*) disclose anhydride copolymer reacted with disperse dye, however, there is no disclosure of ink as required in all the present claims and no disclosure or suggestion in Cherioux et al. to utilize the anhydride copolymer reacted with disperse dye in ink.

Schmidhauser et al. (U.S. 6,232,405) disclose metallic ink comprising styrene-maleic anhydride copolymer reacted with primary or secondary amine.

Blum et al. (U.S. 5,064,921) disclose ink comprising anhydride copolymer having imide group attached thereto.

Bromberg et al. (U.S. 7,001,934) disclose pigment having polymer attached wherein the polymer includes that obtained from maleic anhydride.

Banning et al. '185 (U.S. 7,034,185) disclose colorant precursor compounds used to produce methane colorants.

Banning et al. '189 (U.S. 7,084,189) disclose reaction product of isocyanate and antioxidant or UV stabilizer having isocyanate-reactive group

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Callie E. Shosho whose telephone number is 571-272-1123. The examiner can normally be reached on Monday-Friday (6:30-4:00) Alternate Fridays Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on 571-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Callie Shosho
Callie E. Shosho
Primary Examiner
Art Unit 1714

CS
9/27/06